CLAIM AMENDMENTS

1. (Currently Amended) A composition comprising:

a) an electrode comprising:

i) a self assembled monolayer comprising conductive oligomers; and

ii) a nucleic acid capture probe;

b) a target nucleic acid sequence comprising a first nucleic acid portion that is ~~capable of hybridizing~~ hybridized to said capture probe, and a second portion that ~~does~~ is not hybridized to said capture probe and comprises at least one covalently attached electron transfer moiety (ETM).

2. (Currently Amended) A composition comprising:

a) an electrode comprising:

i) a self assembled monolayer comprising conductive oligomers; and

ii) a nucleic acid capture probe;

b) a label nucleic acid probe comprising a nucleic acid first portion ~~that is capable of hybridizing to a component of an assay complex,~~ and a second non-nucleic acid portion comprising a recruitment linker that ~~does not hybridize to a component of assay complex and~~ comprises at least one covalently attached electron transfer moiety (ETM).

Claims 3-10: (Canceled)

11. (Currently Amended) A method of detecting a target nucleic acid sequence in a test sample comprising:

a) forming a hybridization complex including said target sequence and a capture probe; wherein said capture probe is on an electrode comprising a self assembled monolayer comprising conductive oligomers;

b) directly or indirectly attaching at least one label probe to said target sequence to form an assay complex, wherein said label probe comprises a first portion capable of hybridizing to a component of said assay complex, and a second portion comprising a recruitment linker that

i) does not hybridize to a component of said assay complex; and

ii) comprises at least one covalently attached electron transfer moiety (ETM); and

c) detecting the presence of said ETM using said electrode.

Claims 12-13: (Canceled)

14. (Original) A method according to claim 11 wherein said target sequence is attached to said electrode by hybridizing a first portion of said target sequence to a first capture extender probe, and hybridizing a second portion of said first capture extender probe to a capture probe on the electrode.

Claims 15-22: (Canceled)

23. (Currently Amended) A composition comprising:

a) an electrode comprising:

i) a self assembled monolayer; and

ii) a nucleic acid capture probe;

b) a target nucleic acid sequence comprising a first nucleic acid portion that is ~~capable of hybridizing~~ hybridized to said capture probe, and a second portion that ~~does~~ is not ~~hybridize~~ hybridized to said capture probe and comprises at least one covalently attached electron transfer moiety (ETM).

24. (Currently Amended) A composition comprising:

a) an electrode comprising:

i) a self assembled monolayer; and

ii) a nucleic acid capture probe;

b) a label nucleic acid probe comprising a first nucleic acid portion ~~that is capable of hybridizing to a component of an assay complex~~, and a second non-nucleic acid portion comprising a recruitment linker that ~~does not hybridize to a component of assay complex and~~ comprises at least one covalently attached electron transfer moiety (ETM).

25. (Currently Amended) A method of detecting a target nucleic acid sequence in a test sample comprising:

a) forming a hybridization complex including said target sequence and a capture probe; wherein said capture probe is on an electrode comprising a self-assembled monolayer;

b) directly or indirectly attaching at least one label probe to said target sequence to form an assay complex, wherein said label probe comprises a first portion capable of hybridizing to a component of said assay complex, and a second portion comprising a recruitment linker that

i) does not hybridize to a component of said assay complex; and

ii) comprises at least one covalently attached electron transfer moiety (ETM); and

c) detecting the presence of said ETM using said electrode.

26. (New Claim) A composition comprising:

a) an electrode comprising:

i) a self assembled monolayer comprising conductive oligomers; and

ii) a nucleic acid capture probe;

b) a target nucleic acid; and

c) a label nucleic acid probe comprising a first nucleic acid portion that is hybridized to said target nucleic acid, and a second nucleic acid portion comprising a recruitment linker that comprises at least one covalently attached electron transfer moiety (ETM).

27. (New Claim) A composition comprising:

a) an electrode comprising:

i) a self assembled monolayer; and

ii) a nucleic acid capture probe;

b) a target nucleic acid; and

c) a label nucleic acid probe comprising a first nucleic acid portion that is hybridized to said target nucleic acid, and a second nucleic acid portion comprising a recruitment linker that comprises at least one covalently attached electron transfer moiety (ETM).

28. (New) A composition according to claims 1, 2, 23, 24, 26, or 27 wherein said ETM is ferrocene.

29. (New) A composition according to claim 1, 2, 23, 24, 26, or 27 wherein said label probe comprises a plurality of ETMs.

30. (New) A composition according to claim 1, 2, 23, 24, 26, or 27 wherein said first portion of said label probe further comprises a covalently attached ETM.

31. (New) A composition according to claim 1, 2, 23, 24, 26, or 27 wherein said assay complex comprises an amplifier probe.

32. (New) A composition according to claim 1, 2, 23, 24, 26, or 27 wherein said assay complex comprises a capture extender probe.

33. (New) A composition according to claim 1, 2, 23, 24, 26, or 27 wherein said monolayer further comprises insulators.

34. (New) A composition according to claim 1, 2, 23, 24, 26, or 27 wherein said capture probe is attached to said electrode via a conductive oligomer.

35. (New) A composition according to claim 1, 2, 23, 24, 26, or 27 wherein said capture probe is attached to said electrode via an insulator.

36. (New) A method according to claim 11or 25 wherein said label probe comprises a plurality of ETMs.

37. (New) A method according to claim 11or 25 wherein said target sequence is attached to said electrode by hybridization to a capture probe.

38. (New) A method according to claim 11or 25 wherein said target sequence is attached to said electrode by

a) hybridizing a first portion of said target sequence to a first portion of a first capture

extender probe;

b) hybridizing a second portion of said first capture extender probe to a first portion of an capture probe on the electrode;

c) hybridizing a second portion of said target sequence to a first portion of a second capture extender probe; and

d) hybridizing a second portion of said second capture extender probe to a second portion of said capture probe.

39. (New) A method according to claim 11or 25 wherein said label probe is attached to said target sequence by hybridizing said first portion of said label probe to a first portion of said target sequence.

40. (New) A method according to claim 11or 25 wherein said label probe is attached to said target sequence by

a) hybridizing a first portion of an amplifier probe to a first portion of said target sequence; and

b) hybridizing at least one amplication sequence of said amplifier probe to said first portion of at least one label probe.

41. (New) A method according to claim 11or 25 wherein said label probe is attached to said target sequence by

a) hybridizing a first portion of a first label extender probe to a first portion of a target sequence;

b) hybridizing a second portion of said first label extender probe to a first portion of an amplifier probe;

c) hybridizing at least one amplication sequence of said amplifier probe to said first portion of at least one label probe.

42. (New) A method according to claim 11or 25 wherein said label probe is attached to said target sequence by

a) hybridizing a first portion of a first label extender probe to a first portion of a target

sequence;

b) hybridizing a second portion of said first label extender probe to a first portion of an amplifier probe;

c) hybridizing a first portion of a second label extender probe to a second portion of a target sequence;

d) hybridizing a second portion of said second label extender probe to a first portion of an amplifier probe;

e) hybridizing at least one amplification sequence of said amplifier probe to said first portion of at least one label probe.

43. (New) A composition according to claims 2 or 24 wherein said second non-nucleic acid portion is a metallocene polymer.

44. (New) A composition according to claim 43 wherein said metallocene polymer is a ferrocene polymer.

REMARKS

After entry of the above amendments, claims 1, 2, 11, 14 and 23-44 are pending in the application. No new matter is introduced by this amendment.

Objection to Title

The title of the instant application stands objected to as not clearly indicative of the invention to which the claims are directed. As shown in the amendment to the specification presented above, the title has been replaced with "Methods and Compositions for Electronic Detection of Nucleic Acids Using Monolayers." In light of this amendment, withdrawal of the objection is respectfully requested.

Objection to Disclosure

The disclosure stands objected to for the misspelling of the word "sequence" in Claim 13, Line 1. In light of the amendment to the claims presented above, withdrawal of this objection is respectfully requested.

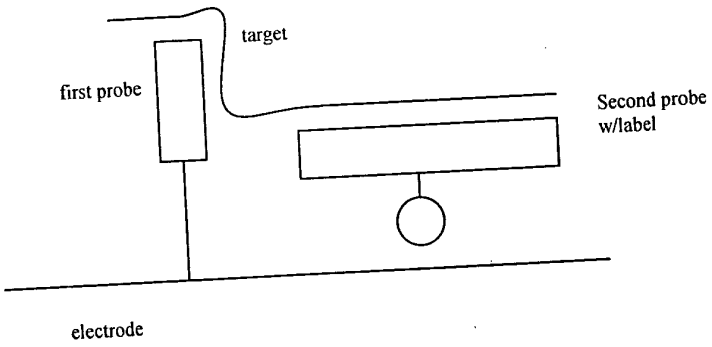
Rejection Under 35 U.S.C. § 102(e)(2)

Claims 1-9, 11-13, 16, and 23-25 stand rejected under 35 U.S.C. § 102(e)(2) as being anticipated by Kayyem et al., U.S. Patent No. 6,090,933, ("Kayyem"). The Examiner bases this rejection in particular on the disclosure of Kayyem at Column 3, Lines 11-27. This section of Kayyem teaches a method of detecting a nucleic acid target sequence, and reads in part:

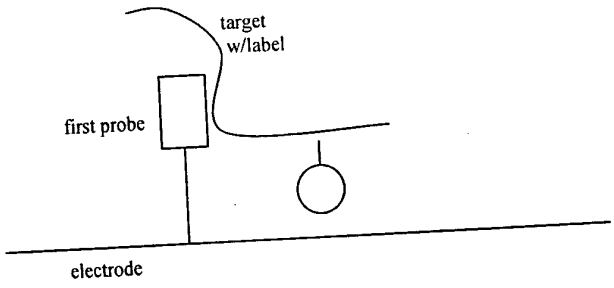
> "The method comprises hybridizing a first probe nucleic acid to the first target domain, if present, to form a hybridization complex. The first probe nucleic acid comprises a conductive oligomer covalently attached to (1) a first electron transfer moiety comprising an electrode and (2) a single stranded nucleic acid capable of hybridizing to the target sequence. Then, a second single stranded nucleic acid comprising a covalently attached electron transfer moiety to the second target domain, and electron transfer is detected between said electrode and said electron transfer moiety, if present, as an indicator of the presen[ce] or absence of said target sequence."

Column 3, Lines 14-26.

The cited passage teaches a method for detecting target sequences in a sample that employs an electrode, first and second probe nucleic acids and the target sequence. Detection of the target occurs via electron transfer between the electron transfer moiety attached to the second probe nucleic acid and the electrode. This transfer is only detected in the presence of a target that links, via separate hybridization interactions, the first nucleic acid probe (attached to the electrode) and the second nucleic acid probe. The method is illustrated below:



In contrast to the cited passage, Claims 1 and 23, and the claims depending from them, recite a composition comprising an electrode (comprising a self-assembled monolayer and a nucleic acid capture probe) and a target nucleic acid sequence comprising at least one covalently attached electron transfer moiety. This composition is illustrated below:



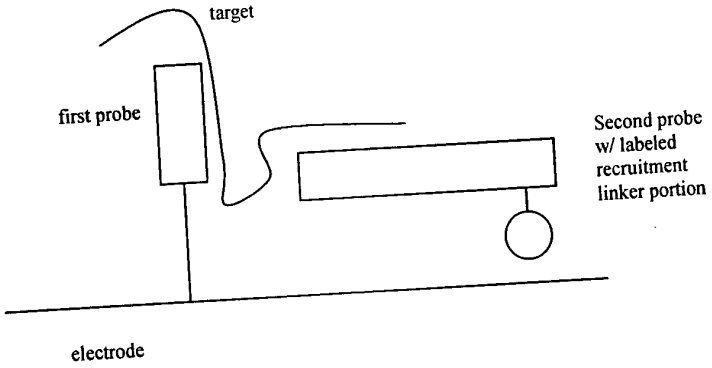
For an anticipation rejection under 35 U.S.C. §102 to be proper, a single reference must expressly or inherently disclose each and every element of a claim. *In re Paulsen*, 31 USPQ2d

1671, 1673 (Fed. Cir. 1994); MPEP § 2131 (citing *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

As discussed above, Claims 1, 23 and the claims depending from them require a target that has a covalently attached electron transfer moiety. Labeled targets such as those in the compositions of Claims 1 and 23 are not taught by the cited portion of Kayyem. As the cited portion of Kayyem does not teach each and every element of Claims 1 and 23, withdrawal of the rejection to those claims is respectfully requested.

The method of target nucleic acid detection taught by the cited passage of Kayyem is discussed above. Kayyem is silent in regards to the use of recruitment linkers for the detection of target nucleic acids.

Claims 2, 11, 14, 24, and the claims depending therefrom, are each directed to compositions comprising an electrode, a capture probe and a second labeled nucleic acid comprising a recruitment linker. This recruitment linker does not hybridize to the target and comprises at least one covalently attached electron transfer moiety. This embodiment is illustrated below



As discussed above, an anticipation rejection under 35 U.S.C. § 102 is only proper when the cited reference teaches each and every element of a claim.

Claims 2, 11, 14, 24, and the claims depending therefrom, each require a second labeled nucleic acid with a second portion that comprises a recruitment linker which does not hybridize to the target and has at least one covalently attached electron transfer moiety. Furthermore, in Claims 2 and 24, the recruitment linker is specifically described as not being comprised of

nucleic acid. As discussed above, Kayyam does not teach recruitment linkers or labeled probes having a non-nucleic acid portion. Accordingly, Kayyam does not disclose each and every element of the cited claims and withdrawal of this rejection is respectfully requested.

CONCLUSION

On the basis of the amendments and remarks presented herein, Applicants believe that this application is now in condition for immediate allowance. Applicants respectfully request that the Examiner pass this application to issue, and early notice of such is requested.

Respectfully submitted,

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